

Synopsis

- India's solar module and cell capacity are expected to touch 200 GWp and 100 GWp, respectively, by FY28 end, outpacing the annual domestic module demand of 50 GWp over the next three years. Integrated players are likely to be more resilient to margin pressure, leading to consolidation of smaller module capacities.
- Tightening policies in the US could impact India's module exports, although the medium-term outlook remains promising, provided Indian players manoeuvre compliance and maintain cost competitiveness.
- The reduction in GST rates could lead to project cost savings of 4-5% owing to a reduction in landed costs of non-DCR and DCR modules by 1.0-1.2 cents/Wp and 1.3-1.6 Cents/Wp, respectively, potentially lowering plain vanilla solar tariffs by Rs 0.06-0.10 per unit in the near-term.
- Given that domestic cell procurement is mandatory under the Approved List of Models and Manufacturers for solar cells (ALMM-II), the prevalent price differential of 5-6 cents for modules complying with the Domestic Content Requirement criteria (DCR modules) vis-à-vis non-DCR modules is likely to push plain vanilla solar tariffs higher by Rs 0.30-0.40 per unit from prevailing levels of Rs 2.5 per unit.
- Recent volatility in input prices driven by supply chain shifts in China underscores the need for further backward integration, which is being headlined by major Indian players with a wafer capacity pipeline of over 30 GWp, entailing a capex of over Rs 20,000 crore. Moreover, the Indian government proposes to provide another demand trigger with the implementation of ALMM-III for ingot/wafer capacity, effective from June 1, 2028.

Solar Push to Take Annual RE Capacity Additions Beyond 40 GW

India's RE capacity stood at ~193 GW as of August 2025, with the solar segment constituting the most significant share at ~123 GW, driven by stellar capacity additions over the past 7-8 years. The rising share of RE capacity reflects strong policy support, enhanced tariff competitiveness, and heightened investor interest. India installed ~29 GW of RE capacity in FY25, followed by ~21 GW during the 5M-FY26 period with accelerated commissioning activities nudged by the impending 25% reduction in waiver of ISTS charges. CareEdge Ratings expects the annual RE installations to exceed 40 GW over the next three years, primarily driven by a healthy pipeline of more than 100 GW.

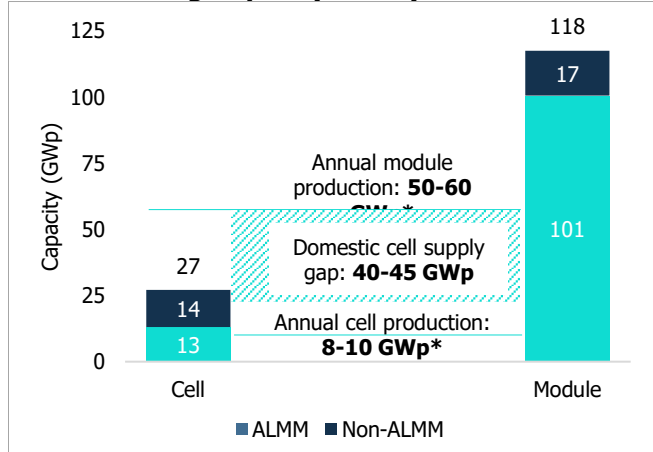
The annual tendering target of 50 GW of RE capacity is likely to fuel growth in the medium term, with the majority expected to come from solar. Significant annual capacity additions of nearly 10 GW will be contributed through rooftop solar, hybrid solar components, and off-grid solar. Apart from this, solar open-access capacities of 4-5 GW are likely to be added annually over the next three years, aided by ESG commitments from corporates and the improving economic viability of C&I projects.

India's Solar Equipment Manufacturing to Enter Oversupply Zone

As of July 2025, India's module manufacturing capacity reached 118 GWp, while cell manufacturing capacity stood at 27 GWp. However, effective operational capacity is estimated at 80-85 GWp for modules and 11-13 GWp for cells, with the remainder in the stabilisation phase. Consequently, annual production is estimated at 50-60 GWp for modules and 8-10 GWp for cells, resulting in an import dependency of 40-45 GWp for cells. This accelerated

capacity expansion has been driven by increased solar installations, proactive policy support, and improved access to financing avenues.

Exhibit-1: India's Cell and Module Manufacturing Capacity at July 2025 end

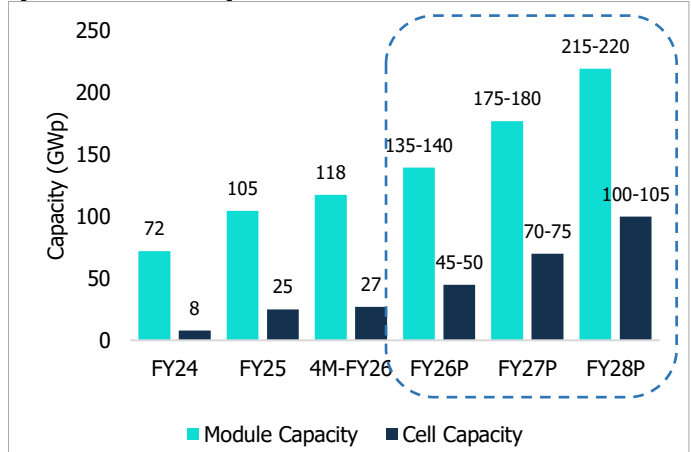


Note: Non-ALMM module capacity as per CareEdge Ratings' estimates

* Effective module capacity of 80-85 GWp @ 60-70% utilisation; effective cell capacity of 11-13% @ 80-85% utilisation

Source: MNRE, Industry Sources, CareEdge Ratings

Exhibit-2: Domestic Modules using Imported Cells (with 25% BCD)



As shown in Exhibit 2, India's module manufacturing capacity is expected to surpass 200 GWp by the end of FY28, nearly three to four times the average annual module demand of 50-60 GWp over the next three years. This growth is supported by planned capacity additions of over 110 GWp from established and new players, entailing a capex of more than Rs 14,000 crore. Domestic cell manufacturing capacity is projected to reach 100 GWp during the same period, with capex exceeding Rs 55,000 crore, driven by backward integration efforts. As a result, CareEdge Ratings expects module production to increasingly rely on exports, even as cell production is also likely to eclipse domestic demand in the medium term. While pureplay module players could be at risk of consolidation, integrated players are likely to withstand the margin pressure owing to cost efficiencies.

Policy Measures to Strengthen the Domestic Solar Module Manufacturing Ecosystem

To build a strong and self-reliant domestic solar module manufacturing ecosystem, the government has implemented targeted demand and supply-side policies. These include imposing Basic Customs Duty (BCD) on imported cells and modules, mandating Domestic Content Requirement (DCR) modules for government-supported projects, stimulating capacity expansion through the Production Linked Incentive (PLI) scheme, enforcing the Approved List of Modules and Manufacturers (ALMM) for modules and cells, and reducing the Goods and Services Tax (GST) burden to lower end-use costs.

- Basic Customs Duty (BCD):** To protect domestic solar manufacturing from predatory Chinese pricing, the government imposed a Basic Customs Duty (BCD) of 25% on cells and 40% on modules from April 01, 2022. This was revised to 20% for both cells and modules, along with an additional Agriculture Infrastructure and Development Cess (AIDC) of 7.5% and 20% on cells and modules, respectively, effective February 02, 2025. Although these levies raise the landed cost by 1-1.5 cents/Wp for cells and 3-4 cents/Wp for modules, imports remain cheaper due to a steep fall in global prices. Nonetheless, BCD remains a key tool to enhance the cost competitiveness of domestic modules.
- Domestic Content Requirement (DCR):** The government has mandated to use DCR modules for key schemes, including the CPSU scheme with Rs 8,600 crore in viability gap funding (VGF) support for 12 GW of

central PSU projects, the PM Surya Ghar Muft Bijli Yojana offering Rs 75,000 crore for setting up of ~25 GW of residential rooftop solar over 2–3 years, and the PM KUSUM Yojana allocating Rs 34,400 crore to support ~9 GW of decentralized solar capacity to be developed by farmers under Component-A.

- **Production Linked Incentive (PLI) scheme:** The PLI scheme, with an endeavour to promote domestic manufacturing, has seen allocation amounting to Rs ~18,000 crore under:
 - Cell + Module capacity – 7.4 GW
 - Deeply integrated capacity – 16.8 GW
 - Fully integrated capacity – 27.4 GW

Capacity expansion under the scheme has seen steady advancement, reaching 2.2 GWp at the wafer stage, 9.7 GWp at the cell stage, and 18.6 GWp at the module stage. However, overall progress has lagged allocated targets due to equipment and skilled labour shortages, which are expected to be gradually ironed out.

- **Approved List of Models and Manufacturers (ALMM):** ALMM-I, initially deferred to March 31, 2024, due to inadequate local module manufacturing capacity, was implemented from April 01, 2024, after strong module manufacturing capacity growth in FY24. It mandates domestic modules for all solar projects except behind-the-meter and export-oriented green hydrogen projects, thereby boosting demand for local modules.

The government has mandated domestic cell procurement through ALMM-II, with an approved list of cell models and manufacturers totalling nearly 13 GWp published on July 31, 2025. The ALMM-II cutoff date has been set at August 31, 2025, requiring all utility-scale tenders submitted after this date to use domestic cells, regardless of their commissioning timelines. For open access and net metering projects, domestic cell sourcing is mandatory for capacities commissioned on or after June 1, 2026. While over 50 GWp of pipeline capacity is expected to enhance domestic cell supply, its sufficiency relative to annual demand will be a key monitorable.

Furthermore, the Ministry of New and Renewable Energy (MNRE), on September 12, 2025, proposed mandatory sourcing of DCR modules made from domestic wafers for utility-scale projects in which bid submission falls on or before the 'cutoff date' and for net-metering and open access projects commissioned on or after the 'effective date' of June 01, 2028. The cutoff date has been defined as the date falling one month after the issuance of the first ALMM-III list for wafers, which shall compulsorily enlist at least three independently owned and operated ingot/wafer units aggregating to a minimum annual capacity of 15 GWp.

- **Reduction in Goods and Services Tax (GST) rates:** The GST Council announced a reduction in GST rates applicable on solar cells and modules from the existing 12% to 5% w.e.f. September 22, 2025, which would reduce the tax component on turnkey solar project contracts from 13.8% to 8.9%. As a result, developers are likely to reap savings of 4-5% on overall project costs due to a reduction in landed costs of non-DCR and DCR modules by 1.0-1.2 cents/Wp and 1.3-1.6 Cents/Wp, respectively, potentially lowering plain vanilla solar tariffs by Rs 0.06-0.10 per unit.

Global dynamics shaping India's solar manufacturing: The role of the US and China

Export Sentiment Weakens on US Policy Shifts; Outlook Holds Promise

India's solar module exports have surged, with the US dominating over 95% of the exports in FY25, making American trade policies crucial for India's solar equipment sector. However, export growth faces headwinds from the Trump-era policy tightening, including the One Big Beautiful Bill Act (OBBBA), which limits investment and production tax credits to projects for which construction has started by July 04, 2026, or to those commissioned

by December 31, 2027. Additionally, the Act's Foreign Entities of Concern (FEOC) restrictions restrict tax credits for entities linked to countries like China through ownership, sourcing, or licensing.

The US International Trade Commission (USITC) has maintained its rigorous stance on anti-dumping and countervailing investigations, having imposed prohibitive duties on Southeast Asian countries in 2024. At the request of the Alliance for American Solar Manufacturing and Trade, a coalition of US-based solar manufacturers, USITC has launched a similar probe into Indian solar exports. This investigation is expected to conclude in the next few months and could lead to duties as high as 214% on Indian solar exports to the US.

Moreover, the Trump administration has also introduced reciprocal tariffs on trading partners, including a cumulative 50% tariff on India, effective from August 27, 2025, in addition to the 14.25% tariff under Section 201, which is applicable till January 2026. While the US Court of Appeals has invalidated the reciprocal tariffs on August 29, 2025, uncertainty prevails, as the tariffs will remain in place until October 14, 2025, during which the US administration has been allowed to appeal in the Supreme Court.

Indian module and cell exports declined by 40-45% in FY25 compared to FY24 due to UFLPA scrutiny on US imports. However, module exports to the US have rebounded in the 3-month FY26 period, driven by impending reciprocal tariffs and RE tax credit restrictions imposed by the Trump administration. Indian cell exports, nonetheless, remained muted during the same period, due to modest domestic cell capacity and healthy realisations available for indigenous cells in India itself.

India's exports to the US remain competitive despite tariff concerns; however, a resolute effort by Indian players to delink their supply chains from Chinese components remains imperative. Nonetheless, a relatively nascent supply chain in the US and progressive decoupling with China may bode well for Indian exporters in the medium term, given that the margins for DCR modules in the US market are nearly 2-3 times those of domestic margins.

India Faces Supply Chain Risks Amid Chinese Corrective Measures for Oversupply

Chinese players and the government have implemented various measures to curb oversupply and alleviate the resultant pricing pressure. The industry association and state-owned energy enterprises have debarred procurement bids priced below the benchmark production cost of 9.5 cents per Wp in large state tenders to restore orderly pricing. The Chinese government announced a reduction in export tax rebate on solar cells and modules from 13% to 9% to curb below-cost export pricing. Chinese polysilicon majors have so far implemented two rounds of voluntary production cuts aimed at pushing prices up towards sustainable levels and have further proposed a government-aided buyout plan worth 50 billion Chinese Yuan (7 billion US Dollars) to retire one-third of China's approximately 3 million tonne polysilicon capacity.

These measures have been reflected in the prices of upstream components, from polysilicon to cells. However, price correction has lagged at the module stage due to overcapacity and restricted market access to the US and India. While such upstream cost fluctuations can be mitigated by most Indian manufacturers through order-backed procurement with price indexation, thereby minimising margin impact, they also highlight the need for backward integration by Indian players to insulate themselves from input volatility and supply chain risks.

Backward Integration: The 'Wafer'ward

Global ingot/wafer capacity is dominated by China, rendering Indian players dependent on China and Southeast Asian nations for wafer supply. While India's operational wafer capacity is currently limited to 2 GWp, major Indian

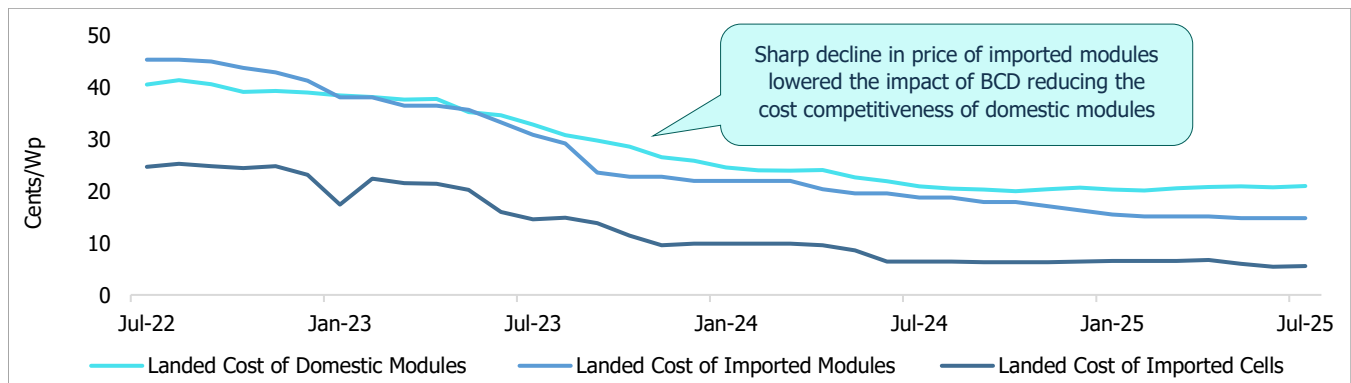
players have announced a pipeline of over 30 GWp to be operationalised over the medium term with an estimated capex of over Rs 20,000 crore.

Recognising the need for self-reliance in wafer supply, the Indian government has awarded wafer capacity of ~40 GWp across deeply integrated and fully integrated categories under the PLI scheme. Moreover, ALMM-III for ingots/wafers, slated to take effect from June 1, 2028, raises entry barriers to aid the development of local upstream capacity. However, challenges such as a limited skilled workforce and dependence on China for machinery and technology need to be addressed.

Module Price Slide Continues, ALMM-II Seen Propping Tariffs

Landed imported module prices continued their downward trajectory from 19 cents/Wp in July 2024 to 15 cents/Wp in July 2025 on account of persistent overcapacity in China. Likewise, a similar dip in cell prices has lowered the landed cost of domestic modules. Although imported modules remain cheaper than domestic modules by nearly 25% despite the applicable duties, non-tariff barriers and government-sponsored schemes continue to prop up demand for domestic modules. Domestic non-DCR module prices have seen a modest increase in FY26 owing to anti-dumping duties on input materials such as aluminium frames and solar glass.

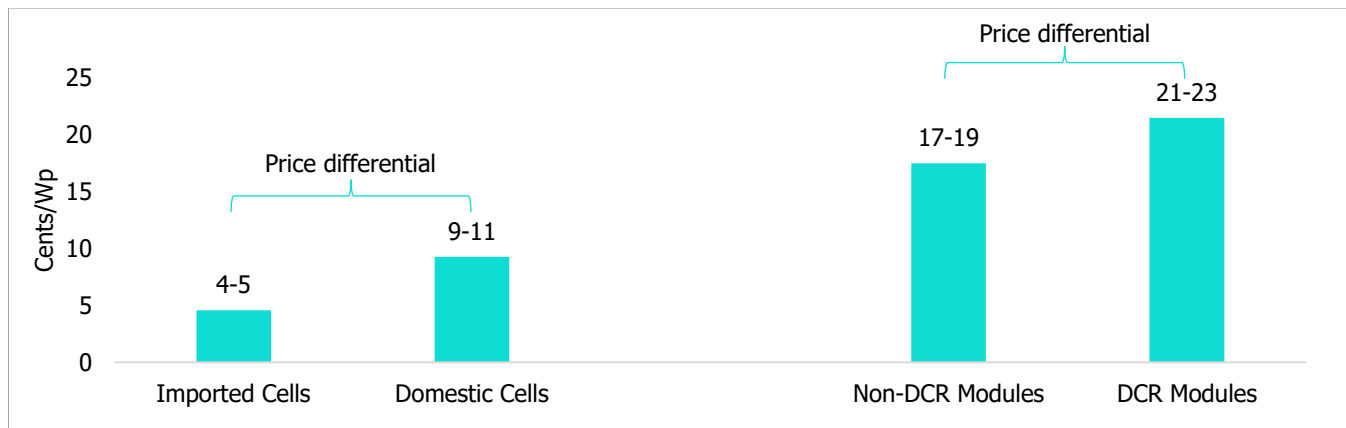
Exhibit 3: Price Trend of Cells and Modules



Source: Industry Sources, CareEdge Ratings

Under the ALMM-II mandate, any utility-scale tenders closed after August 31, 2025, and any open access or net metering capacities commissioned on or after June 1, 2026, must compulsorily procure DCR modules. Considering the price differential of 5-6 cents per Wp for DCR modules vis-à-vis non-DCR modules, CareEdge Ratings estimates an increase of 30-40 paise per unit in plain vanilla solar tariffs from prevailing levels of Rs 2.5 per unit, while the increase could be lower for hybrid or storage-based capacities, given the smaller share of solar capacity in the overall project configuration.

Exhibit 4: Cell and Module Price by make



Source: Industry Sources, CareEdge Ratings

CareEdge Ratings' View

"The solar equipment manufacturing sector has several tailwinds, including robust domestic demand outlook, maturing module capacities, favourable government policies, and improved financing avenues for the RE sector. However, nascent integration of solar equipment capacity, supply chain dependence on China, uncertainty shrouding export prospects, and lagging RE capacity additions due to systemic issues are some headwinds that remain monitorable over the medium term," stated Jatin Arya, Director, CareEdge Ratings.

"While domestic procurement mandates are crucial for incentivising backward integration in local manufacturing, policymaking needs to strike a balance between supply chain independence and energy security at competitive costs," Arya added.

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